

C T Jackson

Boston Jan'y 5th 1844

Prof Asa Gray

My dear Sir,

In reply to your letter of 4th inst I am happy to state that, I have a diagram on a sheet of drawing paper representing the structure of the different varieties of Grains & numerous grains to which the chemical tests have been applied. All of which are at your service. You may have better drawings made from my specimens than I have been able to paint myself - & from your knowledge of the botanical structure of seeds you may be able to bring out some more details regarding the different parts of them, mine having been made only to illustrate the chemical nature of the different parts -

Please refer to the Proceedings of the Bot Soc but first for a brief history of these researches. There you will see that I have credited to my friend A. A. Hayes as I always have done the application of the Sulphate of Copper, & the Sulphurate of Ammonia tests. I mention this since I heard that some Middlesex Presser last summer took the trouble to misrepresent me and said that I took undue credit in this matter to the disadvantage of friend Hayes, while the fact is that I had shown up his remarks in his favour almost neglecting my own it being much more agreeable to me to speak of a friend's remarks than of my own -

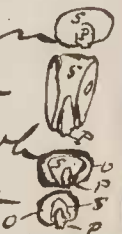
I discovered the Phosphoric acid ^{united with ammonia} or some volatile or destructible base ^{+ Phosphine + Hydrogen} in Corn in 1840 and subsequently in all the other grains in combination with Lime Magnesia & ammonia. I also found Oxide of Iron & Oxide of Manganese in the ashes of grains.


Mr. Hoyer first discovered the application of the tests Sulphate of Copper & Hyd. Sul. Ammonia to determine the limits of these matters in Corn.

I applied them to all kinds of seeds & discovered the general law that the Phosphates & the Iron salt were confined to the Cotyledons of all the seeds which are not so oily as to prevent the action of these tests. - The separation of oil from Corn was discovered by the distillers of Corn Whiskey in the Western States & the process is carried on en grande on the borders of Lake Ontario the oil being used for the Light Houses -

I analyzed several varieties of Corn at the request of Mr. Ellsworth to ascertain the relative amounts of oil in them & found that the Rice Corn contained the most, Canada Pop. Corn next the next rank, & our common flint Corns the next &c. while Tuscarora Corn was found to be quite destitute of oil - The proportions of oil in Corn vary from 6 to 11 per cent according to the variety - This explains the dispute between Sirby & Sumas - The oil is in cells in the transparent glutinous portion of the grains. This I proved by Chemical researches & Owen Mason of Providence has since examined the cells by means of

the microscope formerly belonging to Prof. Bailey & says he has seen the globules of oil in the cells & he has sent me a drawing of their appearance drawn under the Camera Lucida eye piece of the microscope - Corn that contains oil will always explode by parching every cell of gluten & starch when the oil is contained being ruptured by the decomposition of the oil & the formation of gasses. Hence the theory of Pop. Corn explosion

Please try the following varieties Tuscarora Corn which cannot be popped or exploded - Further Corn which explodes on the sides, Brown Corn which explodes near the base Pop. Corn at the summit.  The weakest part of the arch & entirely evolves

Rice Corn which ruptures very irregularly from its being full of oil & having a conical form - 

You may separate the oil from Indian corn meal by fermenting it with a solution of Barley Malt. 100 bushels of Corn yield 15½ Gallons of oil according to the distillers account in Lake Ontario. I suppose the Southern Corn is the variety they use - They ferment with Barley or Corn Malt. Rye absorbs the oil hence none of our distillers using Rye & Corn mixed extract any oil - The Lieve of Dr. Gorbham is Gluten soaked in oil - It contains according to my analysis 5 per cent of Nitrogen - This was overlooked by Gorbham since no accurate proof for the determination of this element was known in his day - It seems strange to me that the presence of Ammonia in Corn was not sooner discovered since it is always separated abundantly in the

process of hulling corn by Potash lye for making
an old Colony dish of Sump or Succata. After my
discovery of it by Analysis I well remembered ~~the~~
odour produced by hulling corn in my mother's kitchen
in Old Plymouth. Our great grandmothers used also
to parch corn & rub their fingers with it preparatory
to spinning because it made their fingers smooth &
oily so that the yarn ran well through them.

Prof. Asa Gray
Harvard University
Cambridge
Mass.

Will you please secure for me two of
the tickets to your lectures & perhaps
one the tickets of visiting July & Aug to
attend my classes with the practice -

Yet we find Libby disputing with Dana, about the
presence of oil in ^{the} grain - ! & many modern Chemists
have overlooked its presence. - I have just been
reading old Carl Dunder's work on the Chemistry
of Agriculture. It was published too early for the age
in 1775. ~~but~~ is a rare & valuable work & takes the
wind out of Dr Dana's sails. All his supposed "discoveries"
being then recorded - Truly yours with esteem
C. J. Jackson